

CLAIMS:

- Sub Q3
1. A process for preparing an extract of a plant of the genus *Trichocaulon* or of the genus *Hoodia*, the extract comprising an appetite suppressant agent, the process including the steps of treating collected plant material with a solvent to extract a fraction having appetite suppressant activity, separating the extraction solution from the rest of the plant material, removing the solvent from the extraction solution and recovering the extract.
2. A process as claimed in claim 1 wherein the plant of the genus *Trichocaulon* is selected from the species *Trichocaulon piliferum* and *Trichocaulon officinale* and the plant of the genus *Hoodia* is selected from the species *Hoodia currorii*, *Hoodia gordonii* and *Hoodia lugardii*.
- Sub Q4
3. A process as claimed in claim 1 or claim 2 which includes the step of concentrating the active agent in the extracted material by further extraction with a solvent.
4. A process as claimed in claim 1, claim 2, or claim 3, wherein the solvent in the solvent extraction step or steps is one or more of methylene chloride, water, methanol, hexane, ethyl acetate or mixtures thereof.
- Sub Q5
5. A process as claimed in any one of claims 1 to 4 inclusive which includes the step of concentrating the active agent in the extracted material by chromatographic separation.
6. A process as claimed in claim 5 wherein the chromatographic separation employs one or more of chloroform, methanol, ethyl acetate, hexane or mixtures thereof as an eluant.

- 5 7. A process as claimed in claim 5 or claim 6 which includes carrying out the chromatographic separation on a column, collecting the eluate in fractions from the column, evaluating the fractions to determine their appetite suppressant activity, and selecting the at least one fraction containing the appetite suppressant agent.
- 10 8. A process as claimed in any of the preceding claims wherein the extract is processed to form a free-flowing powder.
9. An extract comprising an appetite suppressant agent when produced by a process as claimed in any of the preceding claims.
- 15 10. A composition having appetite suppressant activity comprising the extract claimed in claim 9.
11. A composition as claimed in claim 10 when admixed with a pharmaceutical excipient, diluent or carrier.
- 20 12. A composition as claimed in claim 10 or claim 11 which is prepared in unit dosage form.
13. The use of an extract as claimed in claim 9 in the manufacture of a medicament having appetite suppressant activity.
14. An extract as claimed in claim 9 for use as a medicament having appetite suppressant activity.
- 25 15. A method of suppressing an appetite by administering to a human or animal an effective dosage of a composition as claimed in claim 10, claim 11, or claim 12.

5 16. A process for preparing an extract of a plant of the genus *Trichocaulon* or of the genus *Hoodia*, the extract comprising an appetite suppressant agent, the process including the steps of pressing collected plant material to separate sap from solid plant material and recovering the sap free of the solid plant material to form the extract.

17. A process as claimed in claim 16 wherein the extract is dried to form a free-flowing powder.

10 18. An extract comprising an appetite suppressant agent when produced by a process as claimed in claim 16 or claim 17.

19. A composition having appetite suppressant activity comprising the extract as claimed in claim 18.

15 20. A composition as claimed in claim 19 when admixed with a pharmaceutical excipient, diluent or carrier.

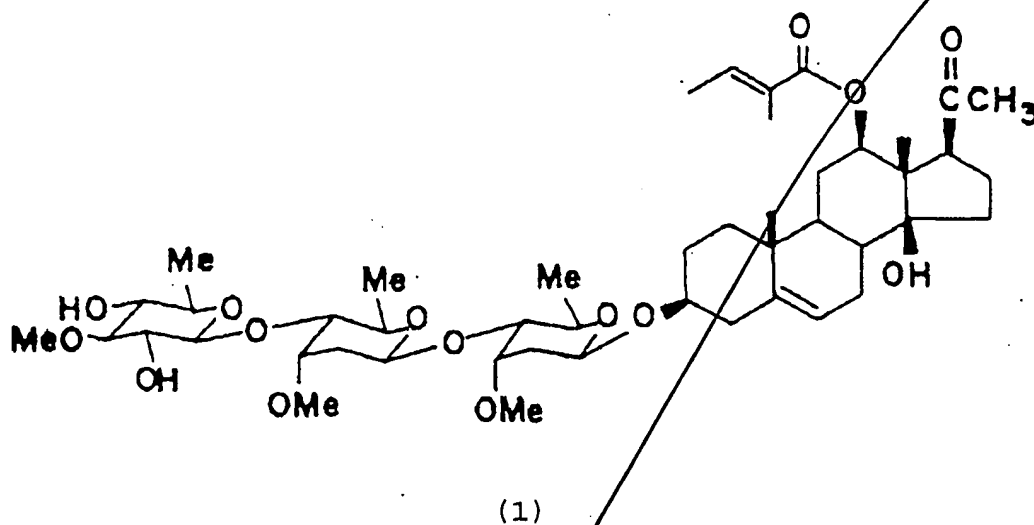
21. A composition as claimed in claim 19 or claim 20 which is prepared in unit dosage form.

20 22. The use of an extract as claimed in claim 19 in the manufacture of a medicament having appetite suppressant activity.

23. An extract as claimed in claim 18 for use as a medicament having appetite suppressant activity.

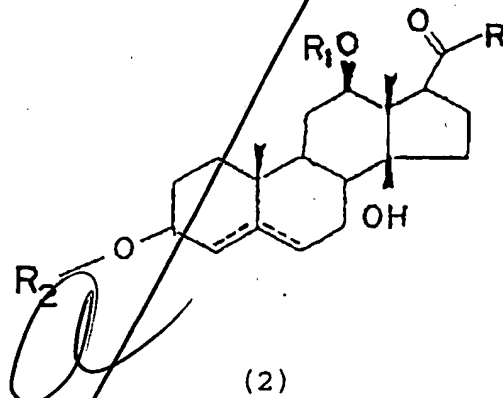
25 24. A method of suppressing an appetite by administering to a human or animal an effective dosage of a composition as claimed in claim 19, claim 20, or claim 21.

25. An extract obtainable from a plant of the genus *Trichocaulon* or of the genus *Hoodia* which comprises an appetite suppressant agent having the formula



26. An extract as claimed in claim 25 wherein the plant of the genus *Trichocaulon* is selected from the species *Trichocaulon piliferum* and *Trichocaulon officinale* and the plant of the genus *Hoodia* is selected from the species *Hoodia currorii*, *Hoodia gordonii* and *Hoodia lugardii*.
27. An extract as claimed in claim 26 wherein substantially all the non-active impurities have been removed.
28. An extract as claimed in any one of claims 25 to 27 inclusive which has been processed to a free-flowing powder.
29. A composition having appetite suppressant activity comprising the extract as claimed in any one of claims 25 to 28 inclusive.
30. A composition as claimed in claim 29 when admixed with a pharmaceutical excipient, diluent or carrier.

31. A composition as claimed in claim 29 or claims 30 which is prepared in unit dosage form.
32. The use of an extract as claimed in any one of claims 25 to 28 inclusive in the manufacture of a medicament having appetite suppressant activity.
33. An extract as claimed in any one of claims 25 to 28 inclusive for use as a medicament having appetite suppressant activity.
34. A method of suppressing an appetite by administering to a human or animal an effective dosage of a composition as claimed in claim 29, claim 30 or claim 31.
35. A compound having the general structural formula



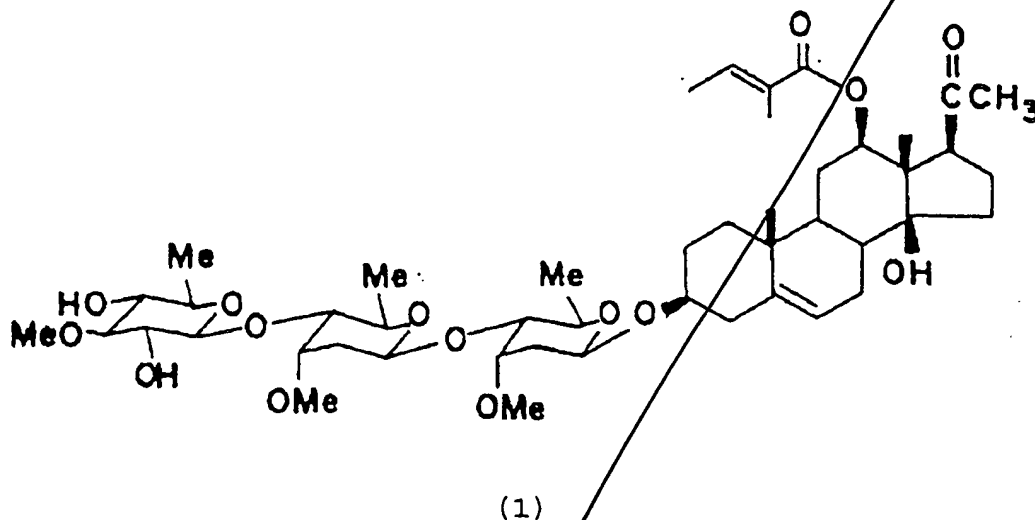
in which R = alkyl;

R₁ = H, alkyl, tigloyl, benzoyl, or any other organic ester group;

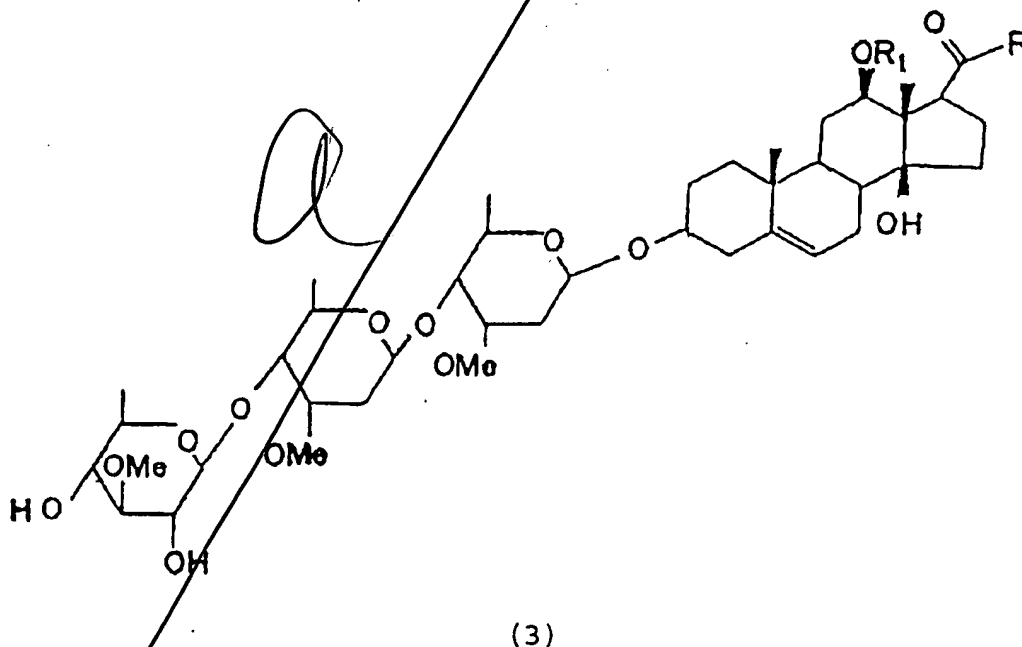
R₂ = H, or one or more 6-deoxy carbohydrates, or one or more 2,6-dideoxy carbohydrates, or glucose molecules, or combinations thereof;

and in which the broken lines indicate the optional presence of a further bond between C4-C5 or C5-C6.

36. A compound as claimed in claim 35 wherein there is a bond between C5- C6, R = methyl, R₁ = tigloyl, R₂ = 3'-O-[-β-D-thevetopyranosyl-(1→4)-β-D-cymaropyranosyl-(1→4)-β-D-cymaropyranosyl], the compound having the structural formula



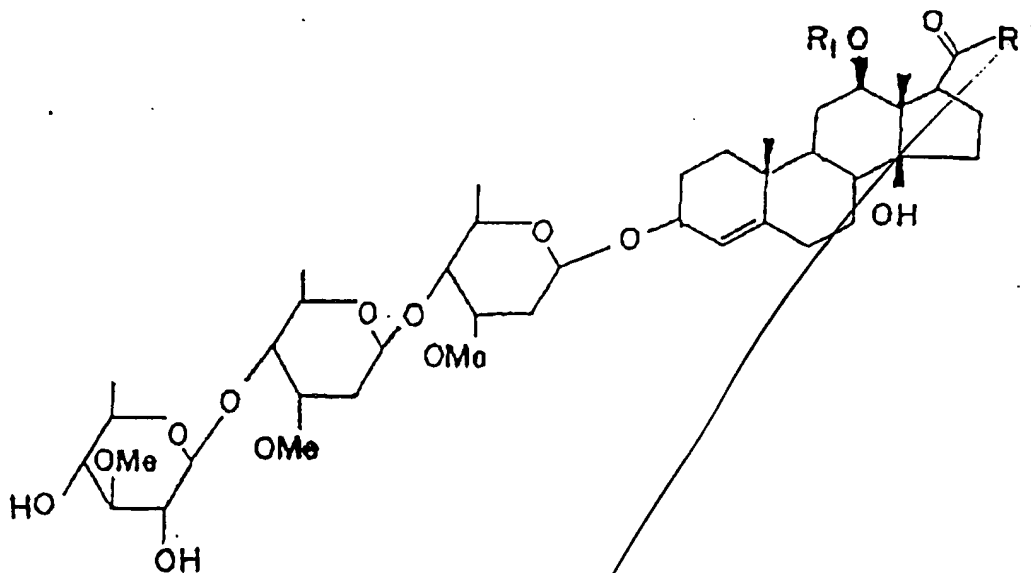
37. A compound having the general structural formula



in which R = alkyl; and

R₁ = H, alkyl, tigloyl, benzoyl, or any other organic ester group.

38. A compound having the general structural formula

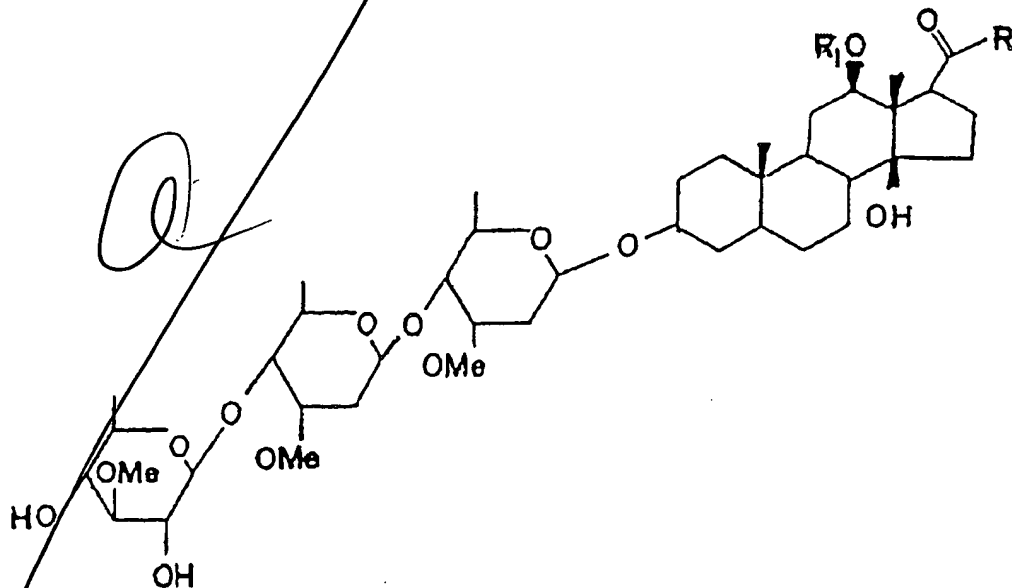


(4)

in which R = alkyl; and

R₁ = H, alkyl, tigloyl, benzoyl, or any other organic ester group.

39. A compound having the general structural formula



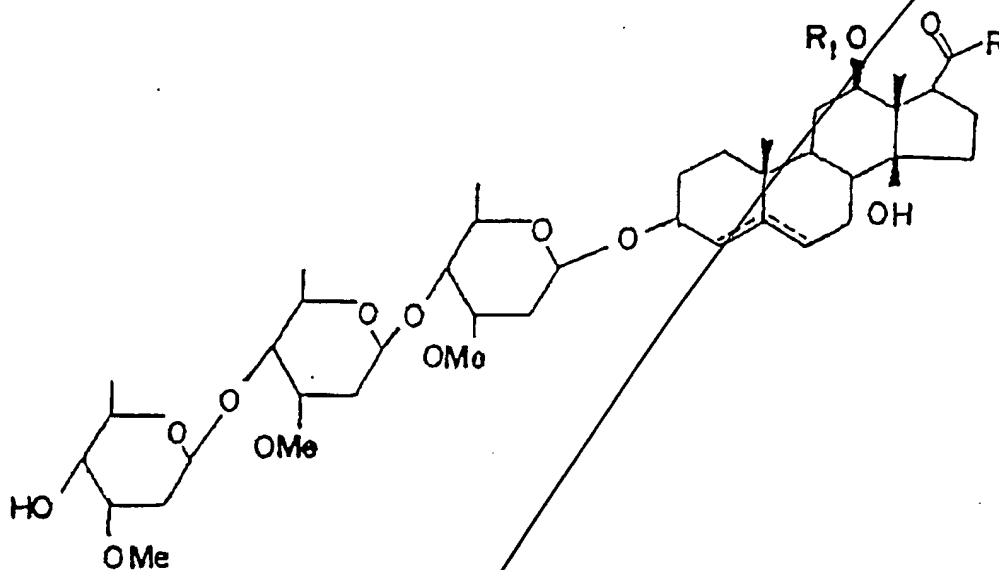
(5)

in which R = alkyl; and

R₁ = H, alkyl, tigloyl, benzoyl, or any

other organic ester group.

40. A compound having the general structural formula

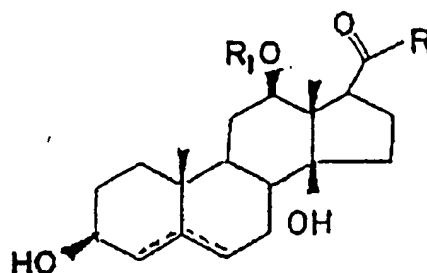


(6)

in which R = alkyl; and

R₁ = H, alkyl, tigloyl, benzoyl, or any other organic ester group.

41. A compound having the general structural formula

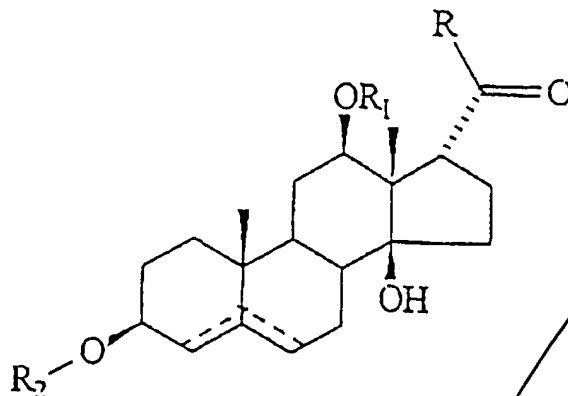


(7)

in which R = alkyl;

R₁ = H, alkyl, tigloyl, benzoyl, or any other organic ester group.

42. A compound having the general structural formula



(8)

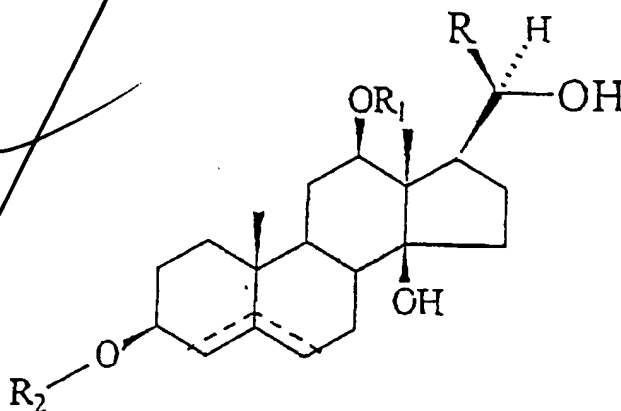
in which R = alkyl; and

R₁ = H, alkyl, tigloyl, benzoyl, or any other organic ester group;

R₂ = H, or one or more 6-deoxy carbohydrates, or one or more 2,6-dideoxy carbohydrates, or glucose molecules, or combinations thereof;

and in which the broken lines indicate the optional presence of a further bond between C4 - C5 or C5 - C6.

43. A compound having the general structural formula



(9)

in which R = alkyl; and

R₁ = H, alkyl, tigloyl, benzoyl, or any

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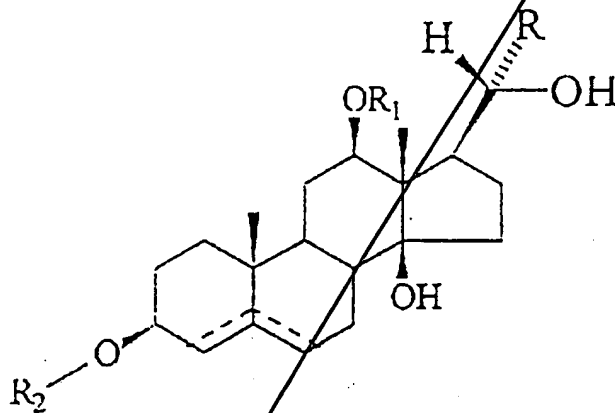
10

other organic ester group;

R_2 = H, or one or more 6-deoxy carbohydrates, or one or more 2,6-dideoxy carbohydrates, or glucose molecules, or combinations thereof;

and in which the broken lines indicate the presence of a further bond between C4 - C5 or C5 - C6.

44. A compound having the general structural formula



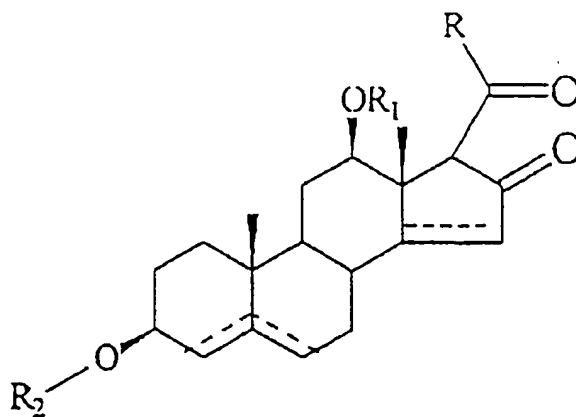
in which R = alkyl; and

R_1 = H, alkyl, tigloyl, benzoyl, or any other organic ester group;

R_2 = H, or one or more 6-deoxy carbohydrates, or one or more 2,6-dideoxy carbohydrates, or glucose molecules, or combinations thereof;

and in which the broken lines indicate the optional presence of a further bond between C4 - C5 or C5 - C6.

45. A compound having the general structural formula



(11)

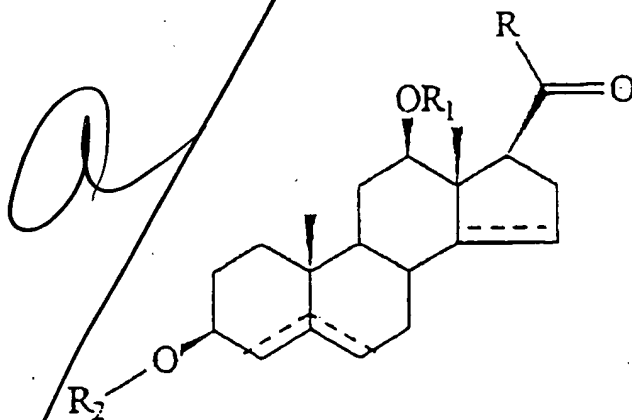
in which R = alkyl; and

R_1 = H, alkyl, tigloyl, benzoyl, or any other organic ester group;

R_2 = H, or one or more 6-deoxy carbohydrates, or one or more 2,6-dideoxy carbohydrates, or glucose molecules, or combinations thereof;

and in which the broken lines indicate the optional presence of a further bond between C4 - C5, C5 - C6 or C14 - C15.

46. A compound having the general structural formula



(12)

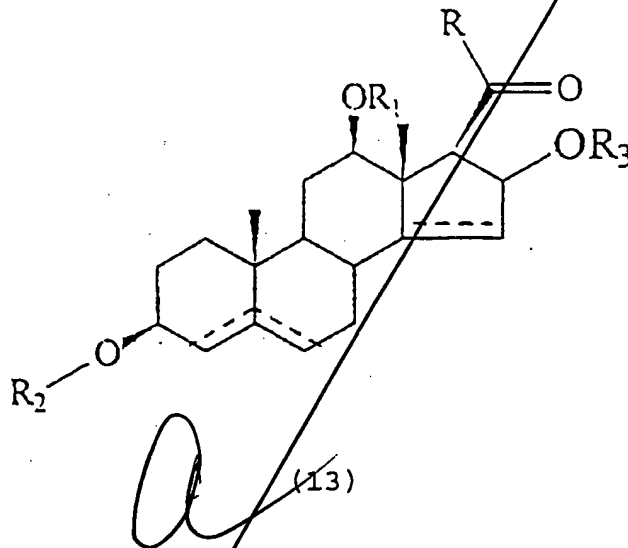
in which R = alkyl; and

R_1 = H, alkyl, tigloyl, benzoyl, any other organic ester group;

R_2 = H, or one or more 6-deoxy carbohydrates, or one or more 2,6-dideoxy carbohydrates, or glucose molecules, or combinations thereof;

and in which the broken lines indicate the optional presence of a further bond between C4 - C5, C5 - C6 or C14 - C15.

47. A compound having the general structural formula



in which R = alkyl; and

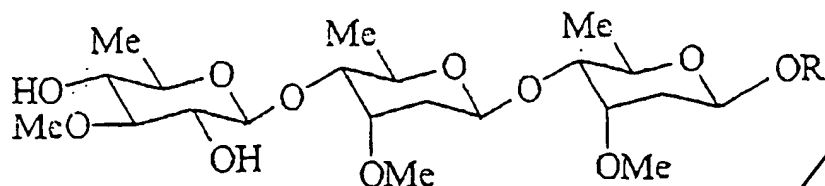
R_1 = H, alkyl, tigloyl, benzoyl, any other organic ester group;

R_2 = H, or one or more 6-deoxy carbohydrates, or one or more 2,6-dideoxy carbohydrates, or glucose molecules, or combinations thereof;

and in which the broken lines indicate the optional presence of a further bond between C4 - C5, C5 - C6 or C14 - C15; and

R_3 = H, alkyl, aryl, acyl, or glucoxy.

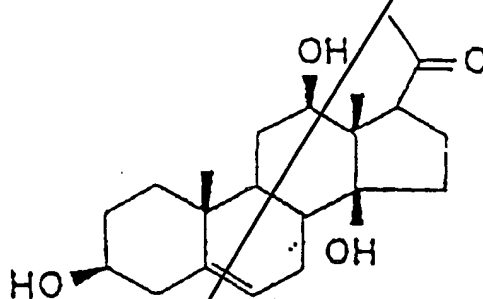
48. A compound having the general structural formula



(14)

in which R = H, alkyl, aryl, or any steroid possessing a C14 beta hydroxy group, a C12 beta hydroxy functionality, a C17 acyl group, a C5 - C6 olefin, or combinations thereof.

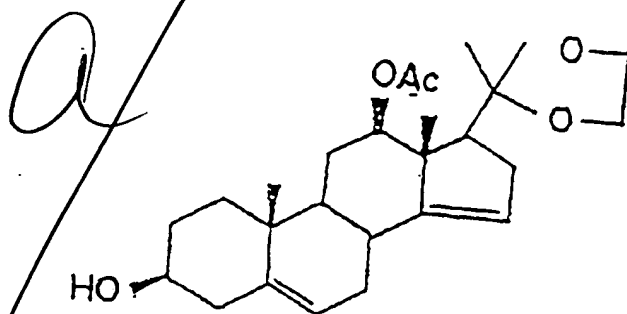
49. A process for the preparation of a steroid intermediate of the formula



(15)

which includes the steps of

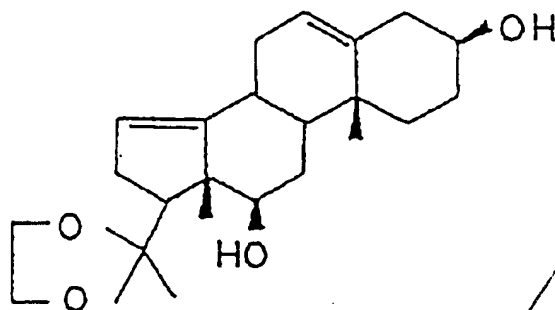
(a) treating the compound



(22)

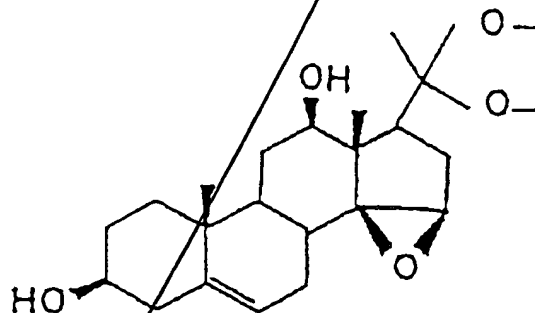
with a reducing agent to produce a compound 3β, 12β-dihydroxy-20,20-ethylenedioxypregna-5,14-diene of the formula

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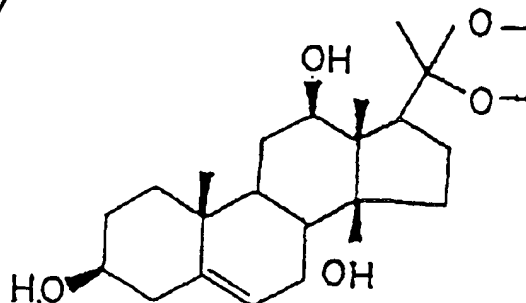
(23)

- (b) treating compound (23) with N-bromoacetamide (NBA) and a base to produce a compound 3 β ,12 β -dihydroxy-14,15-epoxy-20,20-ethylenedioxy-5-ene of the formula



(24)

- (c) treating compound (24) with a reducing agent to produce a compound 3 β , 12 β , 14 β -trihydroxy-20,20-ethylenedioxy-5-ene of the formula

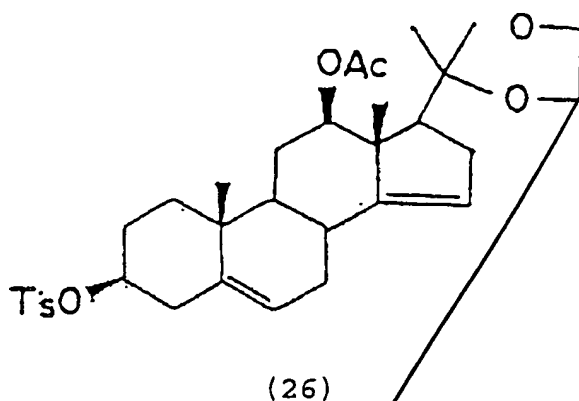


(25)

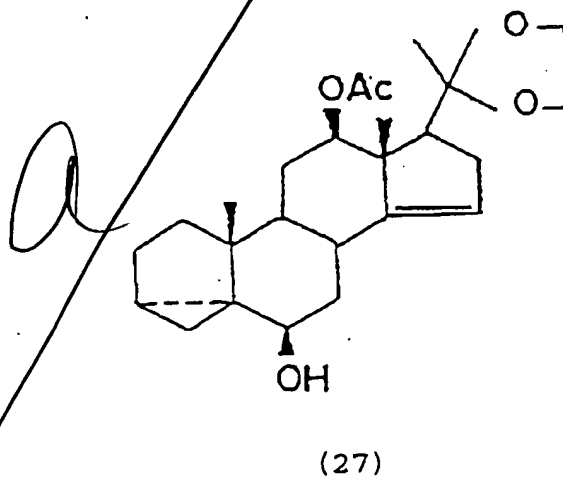
and (d) treating compound (25) with an acid and water to produce compound (15).

50. A process for the preparation of compound (15) which includes the steps of

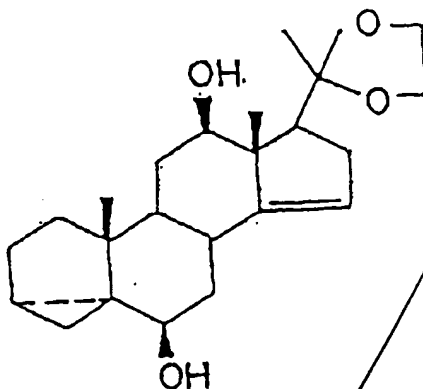
- (a) treating the compound (22) with p-toluenesulfonyl chloride and a base to produce a compound 3β , 12β -dihydroxy-20,20-ethylenedioxypregna-5,14-diene-3-tosyl-12-acetate of the formula



- (b) treating the compound (26) with potassium acetate in a solvent to produce a compound 6β , 12β -dihydroxy-20,20-ethylenedioxy-3,5 α -cyclopregnan-14-ene-12-acetate of the formula

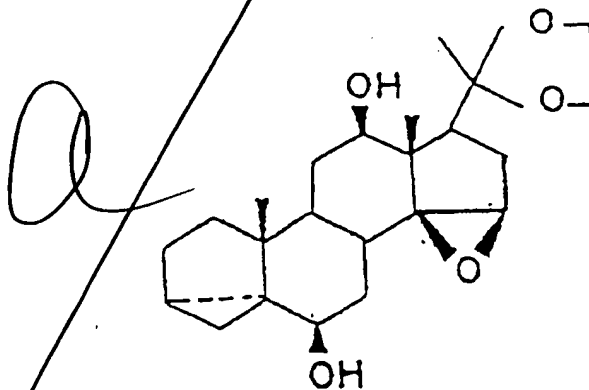


- (c) treating the compound (27) with a reducing agent to produce a compound 6β , 12β -dihydroxy-20,20-ethylenedioxy-3,5 α -cyclopregnan-14-ene of the formula



(28)

- (d) treating the compound (28) with N-bromoacetamide, and a base to produce a compound 6β , 12β -dihydroxy-20,20-ethylenedioxy-14,15-epoxy-3,5 α -cyclopregnane of the formula

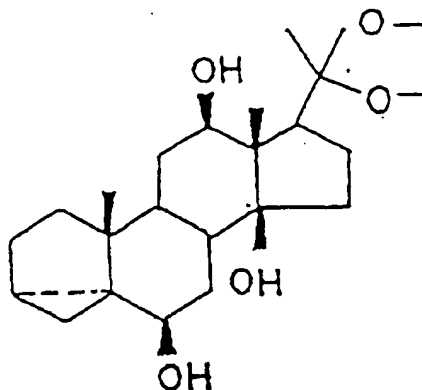


(29)

- (e) treating the compound (29) with a reducing agent to produce a compound 6β , 12β , 14β -trihydroxy-20,20-ethylenedioxy-3,5 α -cyclopregnane of the

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formula

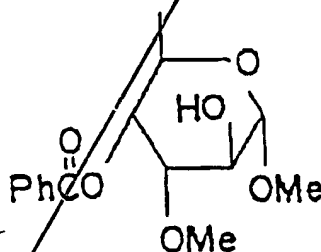


(30)

and (f) treating compound (30) with an acid and a solvent to produce compound (15).

51. A process for the preparation of a carbohydrate intermediate in the form of a monosaccharide cymarose moiety which includes the steps of

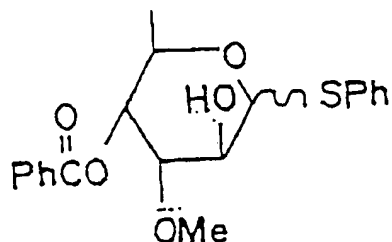
(i) treating the compound of the formula



(36)

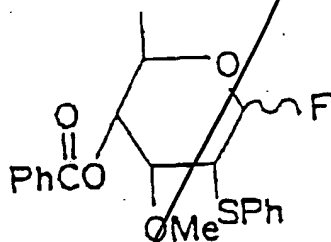
with PhSSiMe_3 , ZnI_2 and Bu_4^+I^- to produce a compound 4-O-benzoyl-3-O-methyl-6-deoxy- $\alpha\beta$ -D-phenylthioaltroside of the formula

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(37)

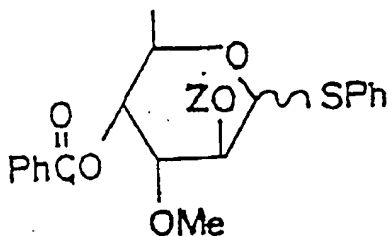
- (ii) optionally treating the compound (37) with diethylaminosulphur trifluoride (DAST) to produce a compound 4-0-benzoyl-3-0-methyl-2-phenylthio-2,6-dideoxy- $\alpha\beta$ -D-fluorocymaropyranoside having the formula



(38)

or

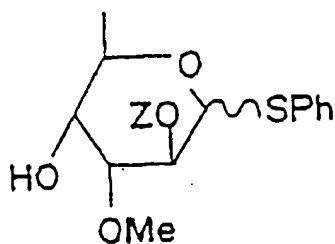
- (iii) optionally, treating the compound (37) with t-butyldimethylsilylchloride and imidazole in a solvent to produce 4-0-benzoyl-3-0-methyl-2-0-t-butyldimethylsilyl- $\alpha\beta$ -D-phenylthioaltroside having the formula



(39)

in which Z = TBDMS = t-butyldimethylsilyl;

and (iv) treating the compound (39) with a base to produce the monosaccharide 3-0-methyl-2-0-t-butyldimethylsilyl- $\alpha\beta$ -D-phenylthioaltroside having the formula

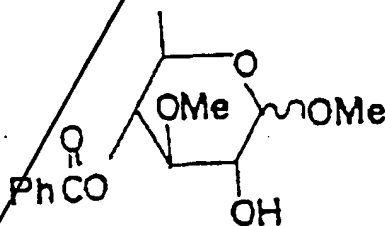


(40)

in which Z = TBDMS = t-butyldimethylsilyl.

52. A process for the preparation of a carbohydrate intermediate in the form of an activated thevetose moiety which includes the steps of

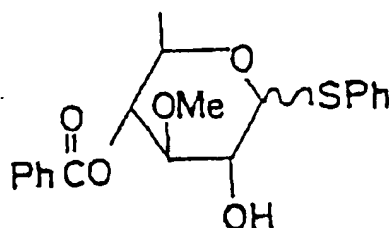
(i) treating the compound



(47)

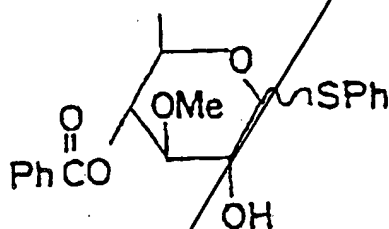
with phenylthiotrimethylsilane and trimethylsilyltrifluoromethanesulphonate to produce a compound 4-0-benzoyl-3-0-methyl-1-phenylthio-6-deoxy- $\alpha\beta$ -glucopyranoside having the formula

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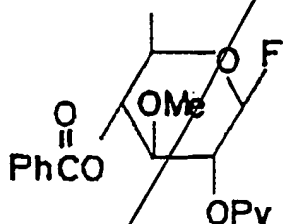
(48)

(ii) treating the compound (48) with pivaloyl chloride and a solvent to produce a compound 4-0-benzoyl-3-0-methyl-2-0-pivaloyl-1-phenylthio-6-deoxy- $\alpha\beta$ -glucopyranoside having the formula

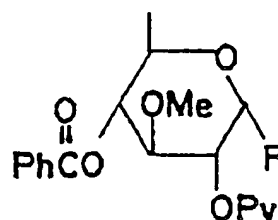


(49)

and (iii) treating the compound (49) with a brominating agent and diethylaminosulphur trifluoride to produce the monosaccharide compound 4-0-benzoyl-3-0-methyl-2-0-pivaloyl-1-fluoro-6-deoxy- β -glucopyranoside occurring as stereoisomers having the formula



(50 A)



(50 B)

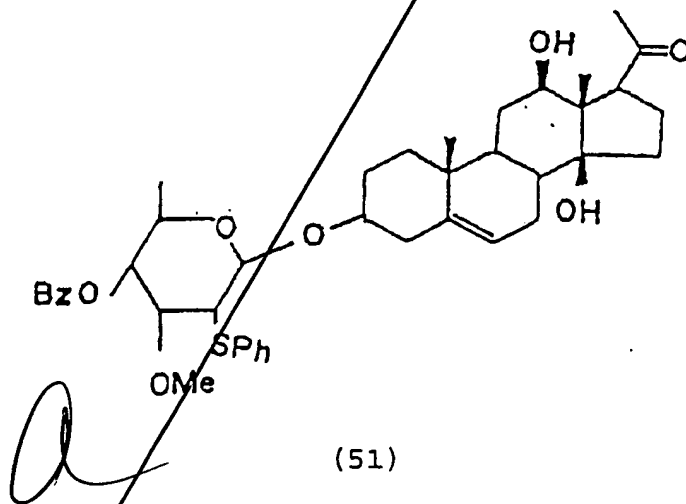
53. A steroid intermediate of formula (15) when produced by a process as claimed in claim 49 or claim 50.

54. A carbohydrate intermediate of formula (40) when produced by a process as claimed in claim 51.

55. A carbohydrate intermediate of formula (50 A) or formula (50 B) when produced by a process as claimed in claim 52.

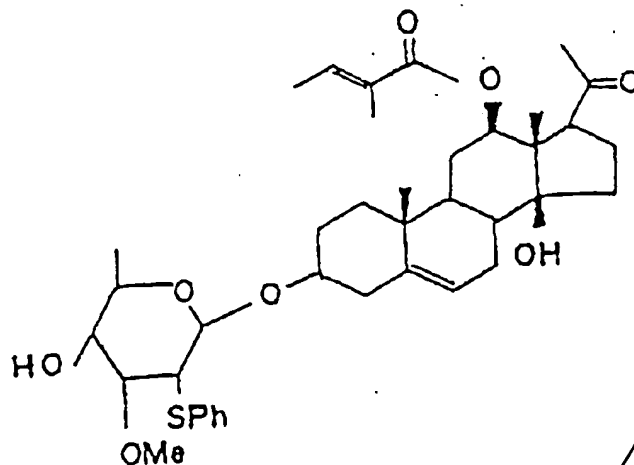
56. A process of coupling a monosaccharide cymarose to a steroid intermediate, which includes the steps of

- i) reacting a cymarose moiety of formula (38) with a steroid intermediate of formula (15) as claimed in claim 53 in the presence of tin chloride in a solvent to produce a compound 3-O-[4-O-benzoyl-2-phenylthio- β -D-cymaropyranosyl]-12,14- β -dihydroxy-pregnan-5-ene-20-one of the formula



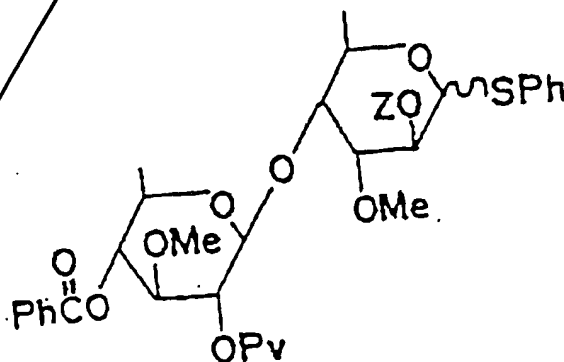
and (ii) treating the compound (51) with tiglic acid chloride in pyridine and thereafter with a base to produce a compound 3-O-[4-O-benzoyl-2-phenylthio- β -D-cymaropyranosyl]-12 β -tigloyl-14 β -hydroxy-pregnan-5-ene-20-one of the formula

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(52)

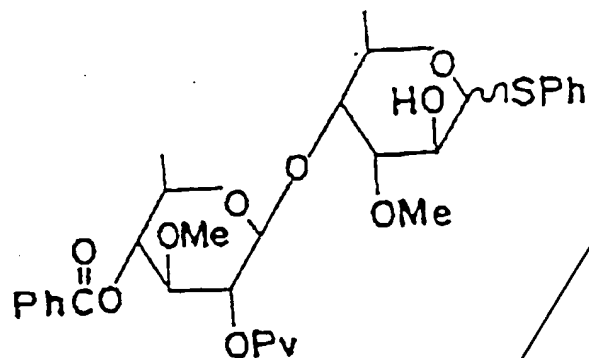
57. A compound of formula (52) when produced by a process as claimed in claim 56.
58. A process of coupling a monosaccharide cymarose moiety to a monosaccharide thevetose moiety and coupling the resultant disaccharide to the compound of formula (52) as claimed in claim 57 which includes the steps of
- coupling a selectively protected cymarose moiety of formula (40) as claimed in claim 54 and a monosaccharide thevetose moiety of formula (50 A) as claimed in claim 55 using tin chloride (SnCl_2) and silver trifluoromethanesulphonate to produce a compound of the formula



(53)

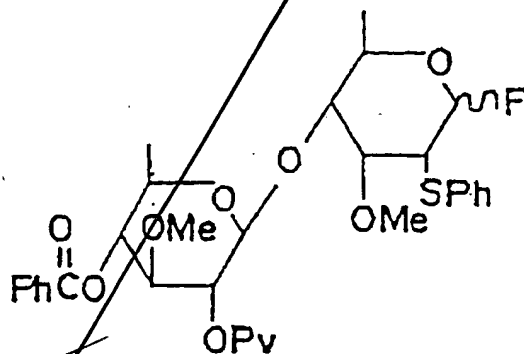
in which Z = TBDMS = t-butyldimethylsilyl

- ii) treating compound (53) with tetrabutylammoniumfluoride to produce a compound of the formula



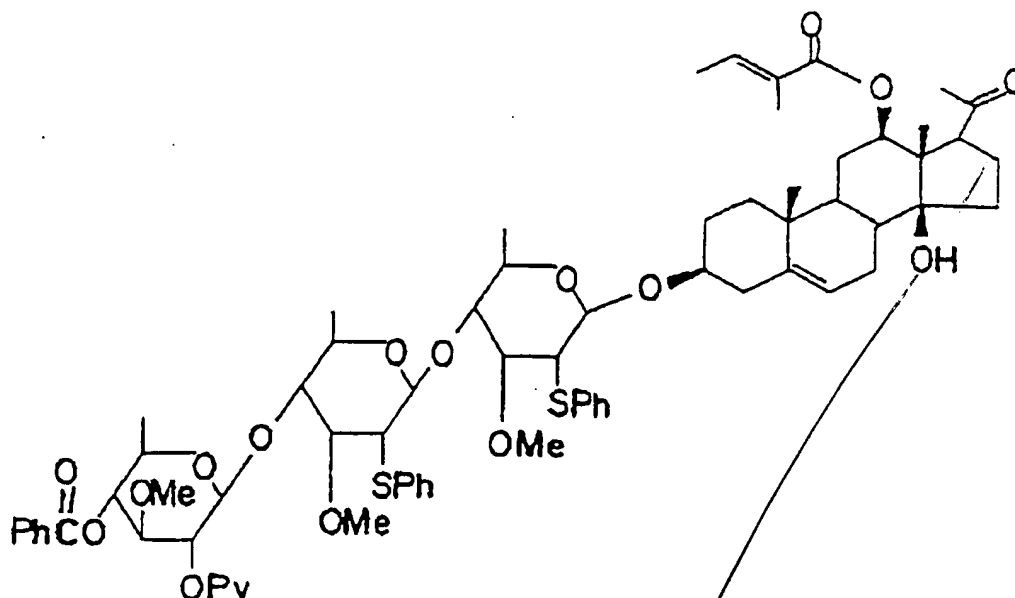
(54)

- iii) treating compound (54) with diethylaminosulphur trifluoride to produce a compound of the formula



(55)

- iv) reacting compound (55) with compound (52) as claimed in claim 57 to produce a compound of the formula

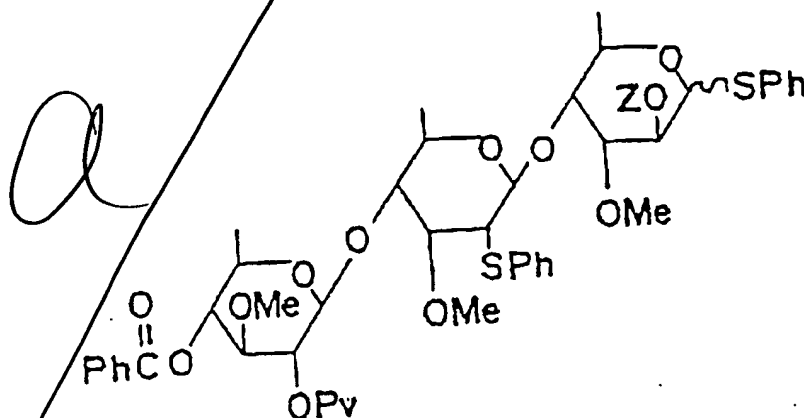


(56)

and (v) treating compound (56) in a Raney-Nickel reaction and thereafter with a base to produce compound (1) as claimed in claim 36.

59. A process of forming a trisaccharide and coupling the resultant trisaccharide to a steroid intermediate, which includes the steps of

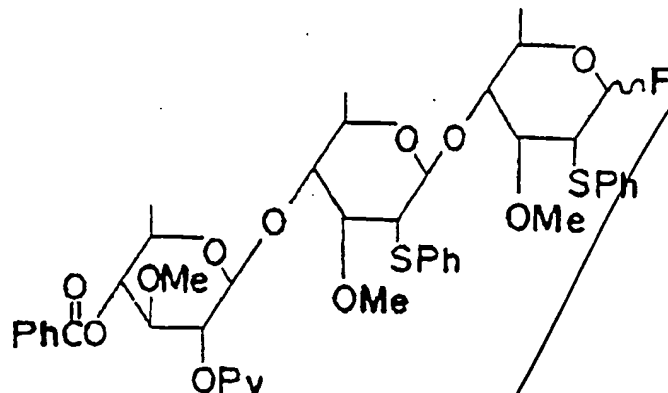
- i) coupling a selectively protected cymarose moiety of formula (40) as claimed in claim 55 and compound (45) using tin (II) chloride, AgOTf, Cp_2ZrCl_2 to produce a compound of the formula



(57)

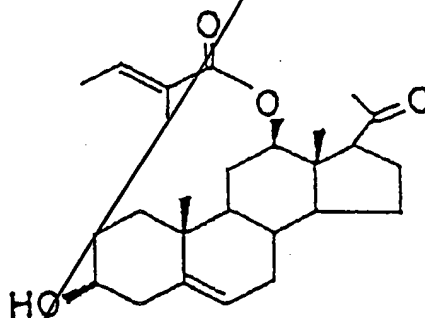
in which Z = TBDMS = t-butyldimethylsilyl;

- ii) treating compound (57) with tetrabutylammonium fluoride and diethylaminosulphur trifluoride to produce a trisaccharide compound having the formula



(58)

- and iii) coupling the trisaccharide of formula (58) with a steroid intermediate of the formula



(59)

using tin (II) chloride, AgOTf, Cp_2ZrCl_2 to produce compound (1) as claimed in claim 36.

60. A composition having appetite suppressant activity comprising a compound as claimed in any one of claims 35 to 48 inclusive.
61. A composition as claimed in claim 60 wherein the compound is the compound of formula (1) as claimed in claim 36.

- 5
62. A composition as claimed in claim 60 or claim 61 when admixed with a pharmaceutical excipient, diluent or carrier.
63. A composition as claimed in claim 60, claim 61, or claim 62, which is prepared in unit dosage form.
64. The use of a compound as claimed in any one of claims 35 to 48 inclusive in the manufacture of a medicament having appetite suppressant activity.
- 10 65. The use as claimed in claim 64 of a compound of formula (1) as claimed in claim 36.
66. A compound as claimed in any one of claims 35 to 48 inclusive for use as a medicament having appetite suppressant activity.
- 15 67. A compound as claimed in claim 66 which is the compound of formula (1) as claimed in claim 36.
68. A method of suppressing an appetite by administering to a human or animal an effective dosage of a composition as claimed in any one of claims 60 to 63 inclusive.
- 20 69. A foodstuff or beverage comprising an effective quantity of a compound as claimed in any one of claims 35 to 48 inclusive to have an appetite suppressant effect when ingested.
- 25 70. A foodstuff or beverage as claimed in claim 69 wherein the compound is the compound of formula (1) as claimed in claim 36.
71. Use of a compound of formula (1) as claimed in claim 36 isolated from a plant of the genus *Trichocaulon* or of the genus *Hoodia* for the manufacture of a

medicament having appetite suppressant activity.

- 5 72. Use according to claim 71 wherein the compound is isolated from the species *Trichocaulon piliferum* or *Trichocaulon officinale* or from the species *Hoodia currorii*, *Hoodia gordonii* or *Hoodia lugardii*.
73. A composition having appetite suppressant activity comprising a compound of formula (1) isolated from a plant of the genus *Trichocaulon* or of the genus *Hoodia*.
- 10 74. A composition as claimed in claim 73 wherein the compound is isolated and/or purified from a plant of the species *Trichocaulon piliferum* or *Trichocaulon officinale* or from of the species *Hoodia currorii*, *Hoodia gordonii* or *Hoodia lugardii*.
- 15 75. A composition as claimed in claim 73 wherein the compound is isolated and/or purified from an extract derived from a plant of the species *Trichocaulon piliferum*, *Trichocaulon officinale* or from a plant of the species *Hoodia currorii*, *Hoodia gordonii* or *Hoodia lugardii*.
- 20 76. A composition as claimed in claim 73, claim 74, or claim 75, when admixed with a pharmaceutical excipient, diluent or carrier.
- 25 77. A composition as claimed in claim 76 which is prepared in unit dosage form.
78. A compound of formula (1) as claimed in claim 35 isolated from a plant of the genus *Trichocaulon* or from the genus *Hoodia* for use as a medicament having appetite suppressant activity.

80. A method of suppressing an appetite by administering to a human or animal an effective dosage of a composition as claimed in any one of claims 73 to 77 inclusive.

81. A composition having appetite suppressant activity comprising a melanocortin 4 receptor agonist.

82. A composition as claimed in claim 81 wherein the agonist is an extract as claimed in claim 9, claim 18 or claim 25, or a compound as claimed in any one of claims 35 to 48 inclusive.

83. A composition as claimed in claim 81 or claim 82 wherein the compound is the compound of formula (1) as claimed in claim 36.

84. A composition as claimed in claim 81, claim 82, or claim 83 when admixed with a pharmaceutical excipient, diluent or carrier.

85. A composition as claimed in any one of claims 81 to 84 inclusive, which is prepared in unit dosage form.

86. The use of a melanocortin 4 receptor agonist in the manufacture of a medicament having appetite suppressant activity.

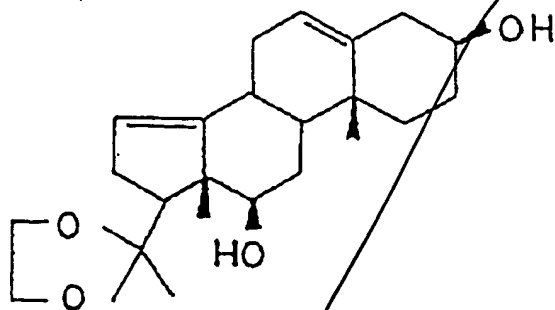
87. The use as claimed in claim 86 of an extract as claimed in claim 9, claim 18 or claim 25, or a compound as claimed in any one of claims 35 to 48 inclusive.

88. The use as claimed in claim 87 of a compound of

formula (1) as claimed in claim 36.

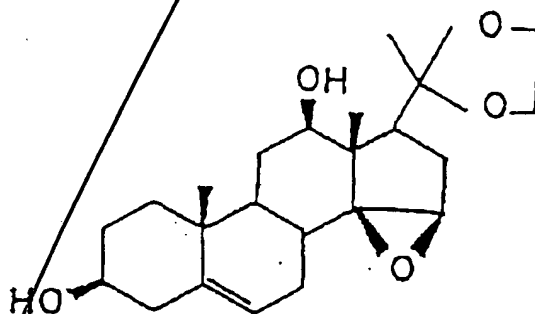
- 5
89. A melanocortin 4 receptor agonist for use as a medicament having appetite suppressant activity.
90. A melanocortin 4 receptor agonist as claimed in claim 89 which is an extract as claimed in claim 9, claim 18 or claim 25, or a compound as claimed in any one of claims 35 to 48 inclusive.
91. A melanocortin 4 receptor as claimed in claim 90 which is the compound of formula (1) as claimed in claim 36.
- 10
92. A method of suppressing an appetite by administering to a human or animal an effective dosage of a composition as claimed in any one of claims 81 to 85 inclusive.
- 15
93. The use of a melanocortin 4 receptor agonist to suppress the appetite of and/or to combat obesity in a human or animal.
- 20
94. The use as claimed in claim 93 of an extract as claimed in claim 9, claim 18 or claim 25, or a compound as claimed in any one of claims 35 to 48 inclusive.
95. The use as claimed in claim 94 of a compound of formula (1) as claimed in claim 36.

96. A compound having the structural formula



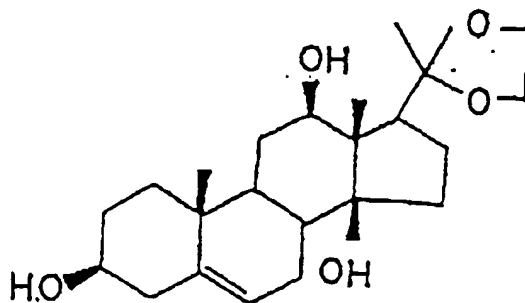
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97. A compound having the structural formula



(24)

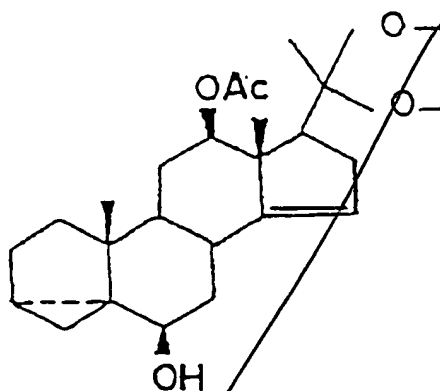
98. A compound having the structural formula



(25)

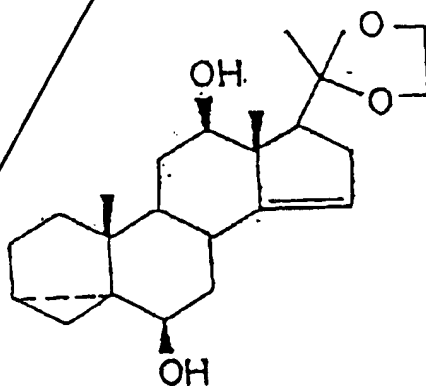
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99. A compound having the structural formula



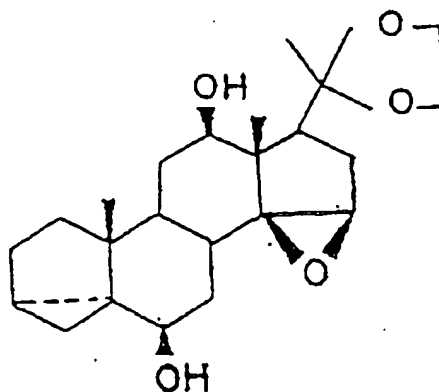
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100. A compound having the structural formula



(28)

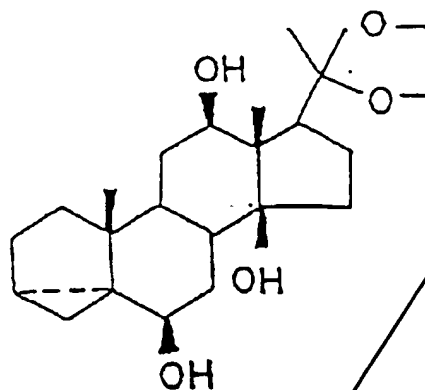
101. A compound having the structural formula



(29)

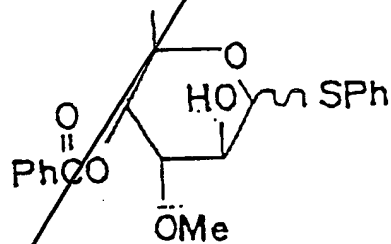
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102. A compound having the structural formula



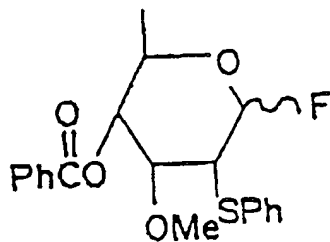
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103. A compound having the structural formula



(37)

104. A compound having the structural formula

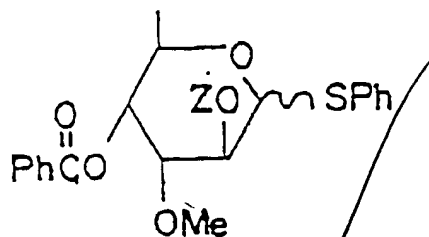


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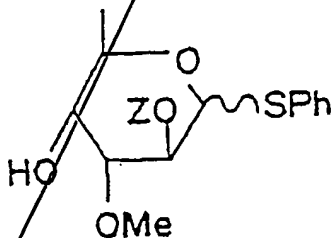
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105. A compound having the structural formula



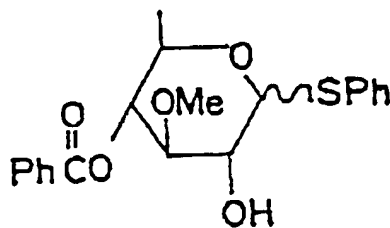
(39)

106. A compound having the structural formula



(40)

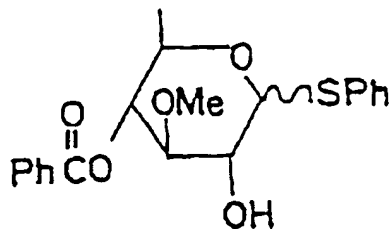
107. A compound having the structural formula



(48)

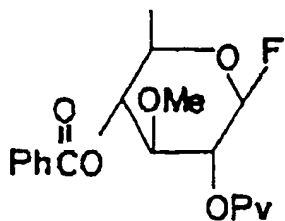
105. A compound having the structural formula
 106. A compound having the structural formula
 107. A compound having the structural formula

108. A compound having the structural formula

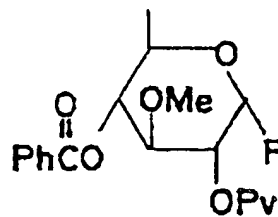


(49)

109. A compound occurring as stereo-isomers having the structural formula

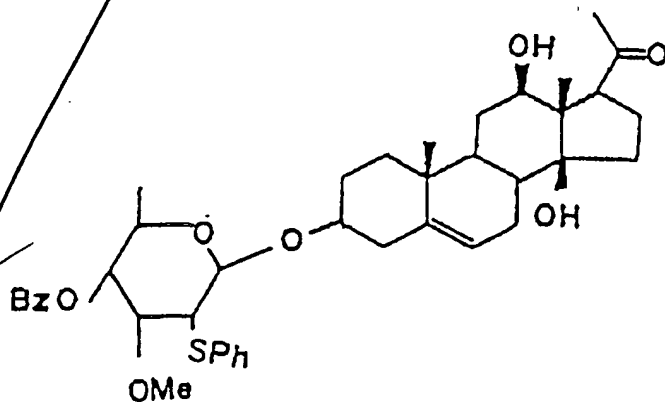


(50 A)



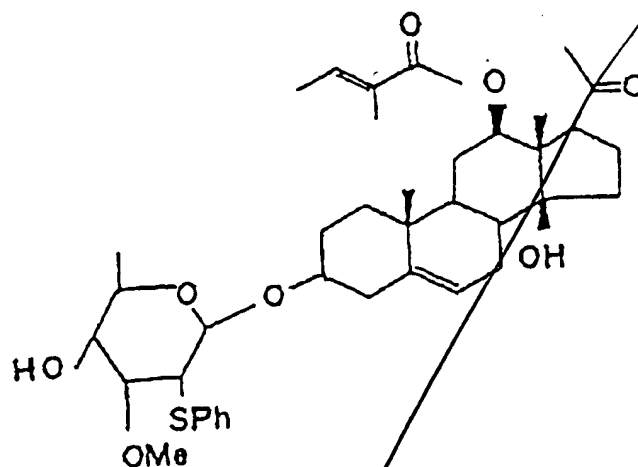
(50 B)

110. A compound having the structural formula



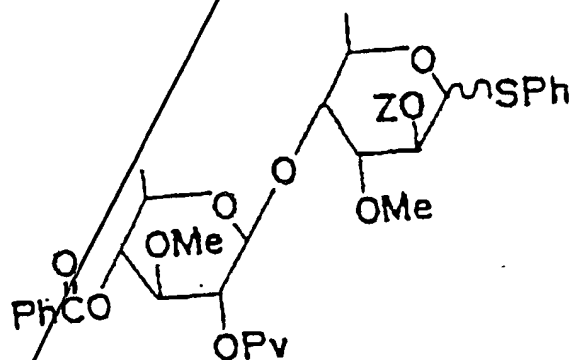
(51)

111. A compound having the structural formula



(52)

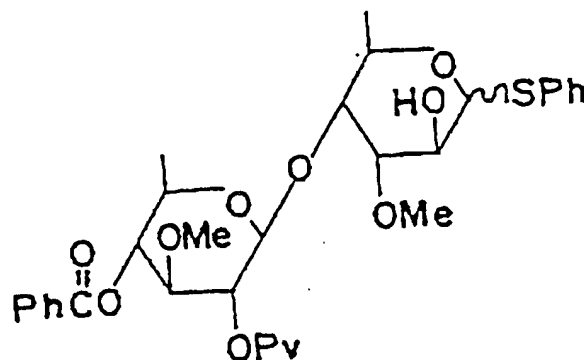
112. A compound having the structural formula



(53)

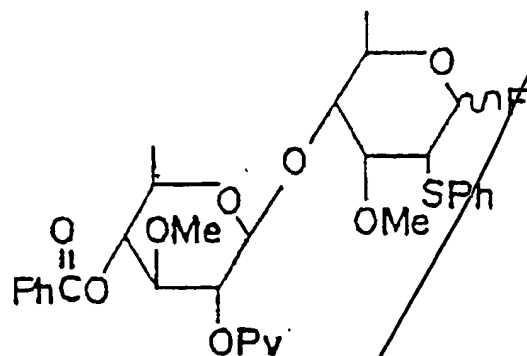
in which Z = TBDMS = t-butyldimethylsilyl.

113. A compound having the structural formula



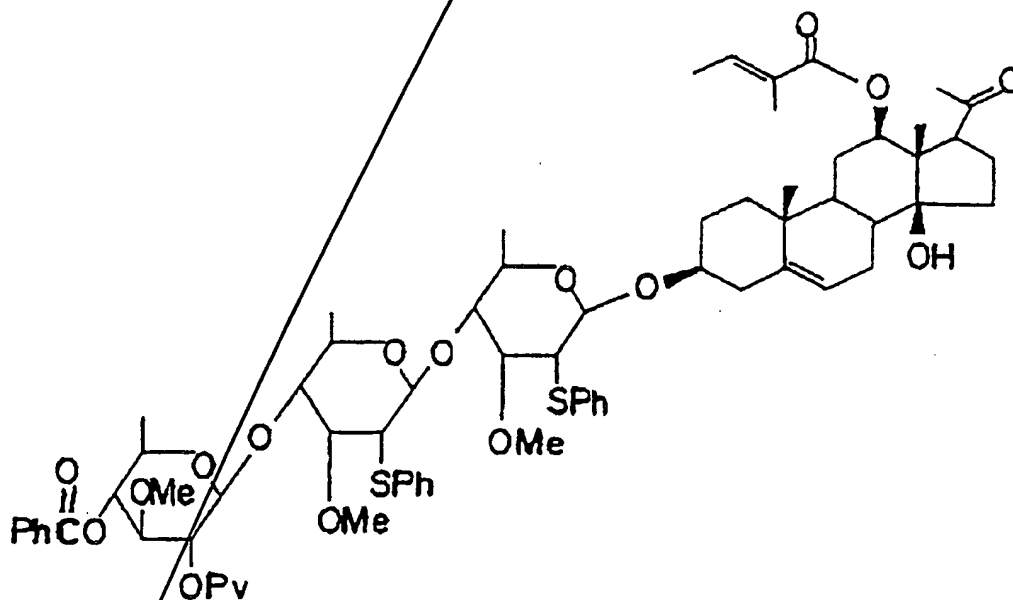
(54)

114. A compound having the structural formula



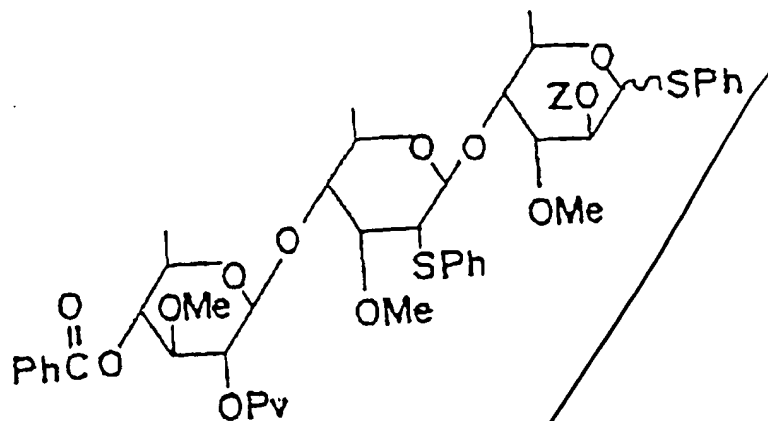
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115. A compound having the structural formula



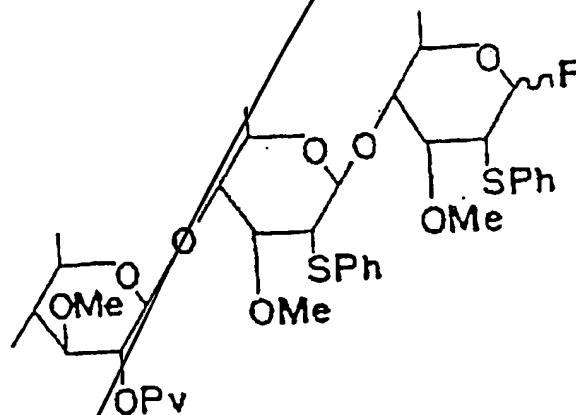
(56)

116. A compound having the structural formula



(57)

117. A compound having the structural formula



(58)

116. A compound having the structural formula

118. A method of combating obesity in a human or animal comprising administering to said human or animal an obesity combating amount of an extract as claimed in any one of claims 9, 25, 26, 27 or 28.

5 119. A method of combating obesity in a human or animal comprising administering to said human or animal an obesity combating amount of a composition as claimed in claim 10.

10 120. A method of combating obesity in a human or animal comprising administering to said human or animal an obesity combating amount of a compound as claimed in claim 35 or 36.

15 121. A structure of the formula 3-O- β -D-theverosyl-(1 \rightarrow 4)- β -D-cymaropyranosyl-(1 \rightarrow 4)- β -D-cymaropyranoside-12 β -O-tigloyl-14 β -hydroxy-pregnane-5-ene-20-one.

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